bearing on the question of the comparative fertility of hybrids (see *Journ. Roy. Hort. Soc.*, vol. xxi., April 1898).

The voluminous records in Mr. Young's stud-book cover a period of about five years, and were specially selected by the writer on account of the reputation of the breeder as a careful observer and a precise recorder. Out of the 577 crosses made by Mr. Young among thirty distinct species and fifty-three distinct hybrids of the new genus Paphiopedium, no less than 78·3 per cent. proved fertile, *i.e.* produced good seeds.

Of these, the crosses between distinct species only, 95·2 per cent. were fertile, while of the crosses in which a hybrid was concerned in the parentage 71·8 per cent. proved fertile.

This seems to show that crosses between distinct species are almost if not quite as fertile as crosses between varieties of the same species (taking the latter at complete fertility, *i.e.* 100 per cent.); while crosses with hybrids, though fertile to a high degree, are yet rather less fertile than crosses between species. A further analysis of the figures shows that while hybrids crossed with pollen of pure species give 89·5 per cent. fertile, yet pure species crossed with pollen of hybrids give but 56·7 per cent. fertile. This points to the conclusion that the slight decline in the fertility of hybrids is due in a large measure to the loss of power in the pollen of hybrids.

Why the male element in hybrids should be so much less potent than the female element I cannot pretend to say, but I venture to think that the matter is worthy of consideration as a possible factor in the evolution of species.

Evolution of Species by Natural Hybridisation.

The experimental demonstration of natural hybrids shows clearly that intercrossing between different species is carried on in a state of nature, to a far greater extent than was formerly supposed; and the comparative fertility of these natural hybrids would be of vital importance to them in their struggle for life.

If, as seems highly probable from the above experiments with orchids, it is the pollen only of hybrids that is impaired, and the capacity of the hybrid to bear seed crossed with the pollen of pure species remains practically unimpaired, it is quite clear that the natural hybrid has a part to play in the evolution of new species.

As we have already seen, hybridisation tends to increase variation especially beyond the first generation, and, naturally, the more variable the offspring the better fitted would they be to adapt themselves to changed conditions of life.

If the circumstances changed rapidly and considerably, the variable offspring of the hybrids would stand a better chance in the struggle for life than the more uniform offspring of the parent species, which were themselves specially adapted to the old conditions. In this way, as conditions changed, new species would be evolved more fitted to the new conditions of life than the old species, which they would gradually replace, and I venture to suggest that natural hybridisation is the most rapid of nature's means towards that end.

C. C. HURST.

THE MEETINGS OF THE BRITISH AND FRENCH ASSOCIATIONS IN 1899.

THE meeting of the British Association next year, as we have already announced, will be held at Dover contemporaneously with the meeting of the Association Française at Boulogne, in order that the two bodies may interchange visits. It has been arranged that the visitors from France shall cross over to Dover on Saturday, September 16, and that the return visit of the members of our Association shall take place on the following Thursday. The arrangements on both sides of the Channel, for the reception of the visitors, are not yet completed; but we understand that while the members of the British Association are at Boulogne, the interesting ceremony of inaugurating a statue of our poet Campbell will take place; and that, at Dover, Dr. Charles Richet, the distinguished professor of physiology in the University of Paris (Faculté de Médecine) has consented to deliver one of the evening discourses. Dr. Richet's interesting reply to the official request, which was sent to him through Dr. Michael Foster, the President-elect, is as follows:—

> Cher maître et collègue,—Je suis trop honoré par la demande que vous me faites pour ne pas accepter immédiatement et sans réserves. Je ne sais pas encore le sujet que je prendrai; nous avons le temps d'en parler.
>
> Si j'accepte ainsi avec joie, c'est que je considère comme vous les dissentiments qui ont séparé et qui séparent nos deux pays, faits pour s'entendre et pour s'aimer, comme absurdes et même criminels. Alors, dans la faible mesure de mes forces, je ferai tout ce qui est en mon pouvoir pour dissiper ces malentendus, et tâcher d'apaiser ces haines.
>
> Paris, Décembre 9. CHARLES RICHET.

We trust that these visits will in no small degree contribute to bring about the result which Dr. Richet so earnestly expresses.

NOTES.

THE Prince of Wales presided at a meeting held at Marlborough House on Tuesday in furtherance of the objects of the recently-formed National Association for the Prevention of Consumption. Sir William Broadbent explained the nature and means of prevention of tuberculous disease, and stated that the objects of the Association were (1) to educate the public as to the means of preventing the spread of consumption from those already suffering from the disease; (2) to extinguish tuberculosis in cattle; (3) to promote the erection of sanatoria for the open-air treatment of tuberculous disease. Lord Salisbury moved the following resolution approving of these objects:—"This meeting desires to express its approval of the effort which is being made by 'The National Association for the Prevention of Consumption and other Forms of Tuberculosis' to check the spread of the diseases due to tubercle, and to promote the recovery of those suffering from consumption and tuberculous disease generally. It also commends the method adopted by the Association of instructing public opinion and stimulating public interest rather than the advocacy of measures of compulsion." The resolution was seconded by Sir Samuel Wilks, the President of the Royal College of Physicians, and carried unanimously. Sir William Broadbent announced that the London partners of Messrs. Werner and Beit have undertaken to erect and equip a sanatorium for tuberculous patients at an estimated expense of 20,000*l.*, the construction and management of which will be under the guidance of the Association. The organising committee have every reason to congratulate themselves on the interest which has been excited in all parts of the country. Branches are being formed in York, Norwich, Ipswich, Huddersfield, and other towns, and at York a considerable sum of money has already been raised for the erection of a sanatorium.

THE Paris correspondent of the *Times* announces that at the annual sitting of the Academy of Sciences on Monday the Lalande prize was awarded to Dr. S. C. Chandler, the Damoiseau prize to Mr. George Williams Hill, and the Houllevique prize to Mr. Branly.

THE death is announced of Prof. H. W. Vogel, the distinguished professor of photography, photo-chemistry, and spectroscopy at the Berlin Technical High School. Prof. Vogel was born in the year 1834, and he devoted his working life and energies to the advancement of photography.

PROF. BEHRING, together with Dr. Ruppel, is reported by the Berlin correspondent of the *British Medical Journal* to have applied for a German patent for a tuberculosis serum. His claim is: "A method for producing a highly poisonous and immunifying substance from tubercle bacilli, or from cultures of tubercle bacilli."

MR. BORCHGREVINK, and the members of the Antarctic expedition under his charge, sailed from Hobart on Monday.

WE learn from the *Lancet* that Luigi Galvani, the great anatomist of the Bolognese school, and better known for his discovery of animal electricity, received on Sunday, December 4, at Bologna, the honour of a centenary celebration—that of his death, which took place on December 4, 1798. The occasion evoked the presence of the leaders of the local medical school, and its orator was Signor Erminio Vitta, representing the Committee of Italian telegraphists now organising a similar commemoration of Alessandro Volta. The proceedings were highly successful.

ON Monday evening Prof. Ramsay delivered a lecture, by special invitation, to the members of the Berlin Chemical Society in the Chemisches Institut, on "The New Gases and their Relations to the Periodic Law." Prof. Liebermann presided, and in the crowded audience were Prof. Virchow, Prof. Liebreich, Prof. von Bezold, Prof. Warburg, Prof. Fischer, and many other eminent men of science. The German Emperor and Empress visited the Chemisches Institut on Tuesday afternoon, in order personally to listen to a private exposition by Prof. Ramsay of his discoveries and methods.

IT has already been announced that the Geological Society has decided to undertake the publication of the manuscript in its possession of a portion of the third volume of Hutton's "Theory of the Earth," and to accept the generous offer of Sir Archibald Geikie to edit and prepare it for the press. The third volume will be printed in the style of the first and second volumes of the same work, and will contain about 300 pages. The manuscript is now ready to go to the printers, and, as only a limited number will be issued, the Secretary of the Society would be glad to receive the names of intending purchasers.

THE Rome correspondent of the *Daily Mail* reports as follows:—Some very important discoveries have recently been made in the Vatican library. While examining some State documents of the sixteenth century, the Abbé Cozza Luzzi, assistant librarian, had the good fortune to find the original manuscript treatise by Galileo Galilei on the tides. The manuscript, which was hitherto only known as N 8193, is all in Galileo's own handwriting, and ends with the words:—"Written in Rome in the Medici Gardens, on January 8, 1616." The great astronomer had dedicated the book to Cardinal Orsino, his admirer, and Mœcenas. Leo XIII. has taken the greatest interest in the discovery, and has ordered the manuscript to be published in an elegant edition at the expense of the Vatican. The discovery of this treatise, the original of which was considered lost, is all the more important as it differs considerably from the text hitherto accepted as Galileo's, and now in course of publication, together with Galileo's complete works, by the Accade mia della Crusca.

Science publishes some particulars in regard to the forthcoming meeting of the American Society of Naturalists, and of the Societies holding their meetings in New York City in conjunction with it. The first meeting of the Society of Naturalists will be in the American Museum of Natural History on December 28. After a welcome by the President of the Museum, Mr. Morris K. Jesup, Prof. Henry F. Osborn will give a lecture on "Collections of Fossil Mammals and their Care." The chief meeting of the Naturalists will be held on the afternoon of December 29 at Schermerhorn Hall, Columbia University. After the Societies have been welcomed by President Low, a series of short papers will be read on "Advances in Methods of Teaching," as follows:—Zoology, Prof. E. G. Conklin, University of Pennsylvania; anatomy, Prof. George S. Huntington, Columbia University; physiology, Prof. W. T. Porter, Harvard Medical School; psychology, Prof. Hugo Münsterberg, Harvard University; anthropology, Dr. Franz Boas, Columbia University; botany, Prof. W. F. Ganong, Smith College.

AT the end of last year the Council of the German Chemical Society appointed a Commission, consisting of Profs. Landolt, Ostwald and Seubert, to draw up a table of atomic weights for use in calculations incident to the practice of analytical chemistry. The report of the Commission is to be found in the last number of the *Berichte*. It is decided to take oxygen as 16·000, and to select atomic weights for other elements in direct or indirect comparison with this value. It is noteworthy that Prof. Seubert, who has hitherto stood out for hydrogen (1·000) as the proper basis for atomic weights, now concedes that for practical purposes oxygen as 16·000 is the more suitable standard. Hydrogen thus becomes 1·01. In the table as printed the atomic weights are not given beyond the last trustworthy figure, and in no case beyond the second decimal place. Nickel is given at 58·7, cobalt as 59; but these numbers are marked as open to some doubt. It is proposed to print the table annually in the *Berichte*, with any revision that may be found necessary. The wish is expressed by the Commission that there should be some international understanding on the subject of the atomic weights used in analytical chemistry; and it is remarked that the achievement of this would not be difficult, since the German table is practically the same as that issued in America by Prof. F. W. Clarke on behalf of the Atomic Weight Commission of the United States. The Council of the Society have requested the Commission to open international negotiations.

THE two following items of news give support to the case for the adoption of the metric system in this country:—The Board of Trade have received information that a large amount of ironwork for bridges in Norway has been ordered from Antwerp. The contractors state that they would gladly have placed the order in England, but have lately gone over to order all their iron from the continent, because they cannot get English makers to supply the work according to the metric system, and it is too complicated for them to work it all out into English measurement, feet and inches.—At a recent meeting of the Bristol Chamber of Commerce it was unanimously resolved: "That the Council of this Chamber, in view of the repeated warnings of H.M. Consuls, and deeply sensible itself of the injury done to British trade by the delay in the adoption of the metric system of weights and measures by this country, strongly urges the Government and all public bodies to aid in making the system familiar to the public, by making use of it in their various contracts, returns, and reports."

UPON the subject of mosquitoes and malaria, the *British Medical Journal* publishes the following note:—We learn on trustworthy authority that the Italian investigators have once again succeeded in conveying to man malarial infection by means of mosquito bites. The parasite in this instance was the benign tertian; the mosquito employed was the same as that which has already proved an efficient transmitter of the malignant tertian parasite—namely, *Anopheles claviger.* In this second successful experiment the mosquitoes were brought from a distance from a notoriously malarial spot, and liberated on the subject of the experiment in Rome. The investigators referred to have not yet discovered Ross's "germinal rods" in mosquitoes purposely fed on crescent-containing blood. We hear, however, that they have found these rods in mosquitoes brought from a distance from houses in which there had been malarial fever cases.

MR. W. GARSTANG's paper on the variation, races, and migrations of the mackerel (*Scomber scomber*), published in the latest number of the *Journal* of the Marine Biological Association, is a valuable contribution to a subject of economic as well as of scientific importance. The investigation was undertaken at the invitation of H.M. Treasury, and its chief object was to discover the relation to one another of the spring and autumn schools of mackerel which regularly visit the Irish coasts. In the spring a multitude of large fish approach the south and west coasts of Ireland to breed. In the autumn, schools of immature, but usually well-grown, mackerel come around the island. These differences are explained by the facts collected by Mr. Garstang; for it appears that the Irish race of mackerel may be subdivided into two distinct stocks.

THE paramount conclusion of the inquiry of Mr. Garstang into the life-history of the mackerel is thus expressed: "The mackerel which frequent British waters are not exactly alike in all localities, but possess certain average peculiarities which distinguish one local race from another. These peculiarities are greatest between the races of localities which are geographically remote, and least between those which occupy areas that are geographically contiguous. Between the mackerel of the North Sea and English Channel there are no differences at all; but the Irish race is distinctly divisible into two stocks, one of which is restricted to the west coast, the other to the south. A considerable amount of mixture takes place between the southern Irish stock and the fish which frequent the mouth of the English Channel. The western Irish stock represents more closely than any other race the primitive type of mackerel, from which all, whether British or American, have been derived." It is pointed out that the establishment of geographical or local races of the mackerel involves the rejection of the theory of long migrations.

AN abstract of a study of the more stable differences of a physical nature which exist between white and negro children of the same sexes and the same ages, is given by Dr. A. Hrdlicka in the *American Anthropologist* (November). It appears that, in a general way, white children present more diversity, negro children more uniformity, in all their normal physical characters. This becomes gradually more marked as age increases. As to physical abnormalities, those of congenital origin are much less frequent in the negro child than in the white one. With acquired abnormalities, principally the result of rachitic conditions, the case is almost the reverse, those characters being less frequent in the white children.

A RECENT number of the *Arbeiten aus dem Kaiserlichen gesundheitsamt* contains a series of reports drawn up by medical officers resident in different parts of German East Africa. These reports are furnished in response to a circular issued by the Colonial Medical Department, containing a list of various subjects upon which it was desired to collect information. Amongst these we find vaccination, the surgical treatment of various wounds, &c., the treatment of mental diseases; whilst special attention is directed to the collection and identification, where possible, of herbs and roots employed for medicinal purposes by the natives. As a result of this circular an immense amount of most valuable and instructive information has been collected, which not only should prove of use, but is also of great interest from an historical point of view, throwing as it does considerable light on the social conditions of these natives. Some curious medical superstitions are recorded, such as the treatment of stings from scorpions by burning the sting of the insect and placing its ashes on the wound; whilst, in the absence of this remedy, salt and snuff are to be rubbed in! The mentally afflicted suffer most from the effect of superstition, however, and have to submit to what can only be described as the most cruel torture to procure the ejection of the evil spirit with which the patient is believed to be possessed. The perpetuation of the race does not seem to be regarded as of much importance, and in the case of one tribe when twins are born, one is always destroyed, usually the last born, except where both sexes are represented, under which circumstance the female is invariably sacrificed. Nothing but praise can be accorded to the enterprising spirit of the German Colonial Department, which is not alone ambitious to extend its dominions, but is equally concerned in obtaining all the information it can about the possessions which it has already acquired.

AMONG the subjects of papers read at the recent conference of the Society for the Protection of Birds, was the decrease in the numbers of swallows and martins coming to this country, by Mr. J. H. Allchin. One of the causes of this decrease is that swallows are netted by the thousand as they came to the shores of Italy in their northward migration, and are eaten as food; they are also caught in great numbers with artificial flies and fish-hooks; all this being contrary to the Italian law and to treaty with the European Powers, which binds Italy not to permit the netting of birds on her shores. As regards destruction of swallows on the southern coast of France, records in official publications testify to the massacre of millions, while on their passage, by means of the net, the fish-hook, and the electric wire. The chief disturbing element in England is the common house sparrow, which persecutes the house martin, ejecting it from its nest, and destroying eggs and young. Mr. Allchin proposed that the Society should present a strong protest to the Governments of Italy and France against the destruction of birds in the course of their annual migrations, and should also petition the Board of Agriculture to send a protest to the aforesaid Governments, on the ground that the destruction of the Hirundinidae and other insectivorous birds was diminishing their numbers to such an extent as to lead to a serious increase of insects injurious to our crops. He further suggested that means should be taken to destroy the eggs (but not the nests) of house sparrows, and that County Councils be petitioned to place all swallows and martins and their eggs on the protected list, and to extend the close season to the full extent of the birds' stay in this country.

DR. TOLLENAAR, writing from Batavia with reference to the alleged momentary increase of temperature in one end of a bar of metal suddenly cooled at the opposite end, calls attention to the fact that the matter was investigated sixty years ago by Schröder in a paper entitled "Kaun die plötzliche Abkühlung eines Theiles einer erwärmten metallische Masse eine plötzliche Temperatursteigung eines anderen Theiles zur Folge haben?" (*Pogg. Ann.*, 46, p. 135.) In our correspondence columns will be found a letter (p. 174), in which it is stated that there is no increase of temperature in the bar when one end is cooled.

DR. G. ERCOLINI contributes to the *Atti dei Lincei* (vii. 8) a note on the variations produced in the dielectric constant of glass by mechanical traction. The experiments, which agree with those of Quincke, serve to verify Lipmann's theory that the dielectric constant of glass increases with traction. The greater the tension the more closely is the increase in the constant proportional to it; at first it falls short of proportionality.

Under the somewhat ambitious and comprehensive title, "On kathodic rays, on Röntgen rays, and on the size and density of atoms," Signor G. Guglielmo discusses in the *Atti dei Lincei*, vii. 8, that much debatable point, the nature of Röntgen rays. The author favours the hypothesis that these rays are due to non-periodic disturbances of the ether; and seeing that the impact of kathodic rays produces in bodies a regular vibration which is fluorescence, Röntgen rays may be due to the ether entrained by the particles of the kathodic rays, and set free when these particles are brought to rest.

In the *Journal* of the Royal Statistical Society (lxi. iii.) Prof. F. Y. Edgeworth is endeavouring to show that the higher theory of probabilities is not restricted to organic nature; but the law of error is fulfilled in social life also, whenever a great number of independent causes act. Remarking that the multifarious motives which sway voters at a contested election may be expected to produce results dispersed about an average according to that normal law, Prof. Edgeworth has obtained tables of the ratio of Unionists to Gladstonians, and Unionists combined in each English constituency for the three last general elections. The grouping of these ratios shows a certain approximation to the normal form. Prof. Edgeworth also discusses the reasons for selecting the above-named ratio as the attribute to be tabulated, and shows that the values of this ratio lie more symmetrically between the mean and the extremes than those of other ratios which might be suggested.

The report on the Administration of the Meteorological Department of the Government of India in 1897-8 shows that the observatories, 174 in number, remain practically the same as in the previous year. In order to give early information of the advent and progress of the south-west monsoon, a daily telegram was received from the Seychelles Islands from May to July. Actinometric observations have been continued as in the eight previous years, and have been sent to the Solar Physics' Committee in London. The day of the total solar eclipse (January 22 last) was remarkably fine nearly all over India, and 158 observers took part in the observations. These have been tabulated and reduced, and it is proposed to publish them in detail during the ensuing year. A large number of reports of earthquake shocks have been received during past years, and copies have been sent to the Geological Survey Department; in future a brief statement of the earthquakes of each month will be published in the *Monthly Reviews*. The results of the cloud observations taken at various stations, in accordance with the scheme proposed by the International Meteorological Committee, are said to be very interesting and encouraging, and will probably throw much light on the meteorology and more massive air currents in India. The extraction of observations made in ships' logs has been continued at several ports; these are used chiefly in the preparation of daily weather charts of the Indian monsoon area. The collection of accurate information relating to the snowfall in the Himalayan and Afghan mountain areas has been continued, and enabled its probable effect in modifying the distribution of the south-west monsoon rainfall to be determined. The work of issuing storm warnings to the various ports appears to have been carried out very satisfactorily; ample notice was given of all the more important storms which visited the Indian coasts during the year in question. The selection of weather types, to aid in the issue of daily forecasts, has been under consideration, and the preparation of an atlas and handbook, with that object in view, will probably be taken up in due course, as it is considered that there are now sufficient materials in the possession of the Department for the adequate treatment of the subject.

Prof. R. H. Thurston calls attention in *Science* to some points of scientific interest in the report of the Chief of the Bureau of Steam Engineering upon the engineering work of the navy in the war with Spain. Some work was performed with marvellous despatch. Thus, the old and worn-out "shell-boilers" of the monitors *Manhattan*, *Mahopac* and *Canonicus*, at League Island, were replaced by new constructions in thirty days. The new water-tube boilers were passed in parts through the hatches, and the old boilers were cut in pieces below and passed up in small sections. Water-tube boilers are unqualifiedly approved for naval purposes, and experience with those of the *Marietta*, while accompanying the *Oregon* on the long 14,000-mile voyage around Cape Horn, proves that such boilers are trustworthy when properly made and handled. The steam turbine is referred to, but with the statement that it is not yet certain that it will find permanent place in the naval service. The use of oil-fuels is pronounced promising in some naval work where costs of fuel are not of prime importance. Success is met with in the use of an oil of specific gravity, 0·85 to 0·87, a flash-point of 315° F., and a burning point of 350° F.

The new volume of "Who's Who" (A. and C. Black) contains several additional features, and more than fifteen hundred new biographies, some of which refer to men of distinction in the scientific world.

A bulky volume of "Anales de la Oficina Meteorológica Argentina" has just been received from the Director, Señor G. G. Davis. The volume is full of statistics referring to the climates of Asuncion in Paraguay, and Rosario in the Province of Santa Fé.

A new part of Prof. G. O. Sars' monograph on the Crustacea of Norway has just been published by the Bergen Museum. The family Oniscidae is concluded, and members of the families Bopyridae and Dajidae are described.

In a pamphlet entitled "A Record of Study of Aboriginal American Languages," Dr. D. G. Brinton surveys his writings in this branch of linguistics, extending over a period of forty years. The papers are arranged geographically, and sufficient reference to their contents is given to indicate their aims and conclusions.

The November (supplementary) number of the *Oesterreichische Monatsschrift für den Orient* includes an important report from Shanghai, dealing with sericiculture in China, to which we particularly call the attention of persous commercially interested in the silk trade.

The last number received of the *Kew Bulletin of Miscellaneous Information* (designated Appendix I , 1899), is entirely occupied by the annual list of seeds of hardy herbaceous plants and of trees and shrubs, which the Department offers in exchange with Colonial, Indian, and foreign botanic gardens, as well as with regular correspondents of Kew.

The United States National Museum has just published a large paper of nearly two hundred pages, with twenty-two plates, by the indefatigable entomologists, Drs. John B. Smith and Harrison G. Dyar, including a revision of the species of *Acronycta* (Ochsenheimer) and of certain allied genera. With this paper is issued a set of seven coloured plates of moths and larvæ belonging to the same group, which were prepared to illustrate an unfinished paper intended to be issued by the Department of Agriculture.

Part i. of the *Proceedings* of the South London Entomological and Natural History Society for 1898 is chiefly devoted to *Lepidoptera*. The most important paper is one by Mr. J. W. Tutt, on the British *Lasiocampidae*, containing a hypothetical phylogenetic tree of the genera. and another exhibiting the phylogeny of super-families of the Sphingo-Micropterygid stirps. There are also notes by Mr. R. South, on British *Lepidoptera* occurring in Japan; and by Mr. A. H. Jones, on some South European *Lepidoptera*, with remarks on the genera *Thais* and *Euchloe*. The only paper relating to a different order is by Mr. E. Saunders, on collecting British *Hemiptera*.

THE Royal Society for the Prevention of Cruelty to Animals has sent us the twenty-ninth annual volume of "The Animal World," and a new volume of the "Band of Mercy." Both volumes are profusely illustrated with pictures of animals, and they will assist the educational work of the Society. Children interested in animals or natural history—and what children are not?—would regard either of the volumes as an acceptable present for Christmas or the New Year.

THE twenty-first volume of *Knowledge*, containing the monthly parts published during the current year, has been received. The articles in the volume deal with many scientific subjects, but the most prominent features are astronomy and natural history. The chief contributors are Mr. R. Lydekker, who writes on various zoological matters; Prof. Grenville Cole, who deals with a number of geological structures and problems; Mr. A. Vaughan Jennings, who contributes a series of botanical studies; and Mr. E. W. Maunder, who writes on interesting astronomical objects and events. Numerous illustrations, many of them full-page plates, and including reproductions of several of Dr. Roberts's marvellous photographs, adorn the pages of the volume.

MR. WILLIAM MARRIOTT informs us that on January 2, 1899, the offices of the Royal Meteorological Society will be removed to Princes Mansions, 70 Victoria Street, Westminster, S.W., to which address all communications, on and after that date, should be forwarded.

THE Tidal Survey branch of the Department of Marine and Fisheries of the Dominion of Canada has issued a collection of tide-tables for Halifax, Quebec, and St. John, for the year 1899, with tidal differences for the Atlantic coast of Nova Scotia, and for the St. Lawrence River, from Three Rivers to Gaspe.

PSYCHOLOGISTS and students of the philosophy of science will be interested in the announcement that, under the title of "Truth and Error, or the Science of Intellection," Messrs. Kegan Paul, Trench, Trübner, and Co., Ltd.. will shortly publish a new book by Mr. J. W. Powell, the Director of the United States Bureau of American Ethnology, and sometime Director of the United States Geological Survey.

THE Tuesday evening penny science lectures will be resumed at the Royal Victoria Hall, Waterloo Bridge Road, on January 3, when the Rev. R. H. Whitcombe will discourse on "Science Jottings in Switzerland." On January 10, Mr. R. A. Gregory will lecture on "Astronomy before Telescopes"; and on January 17, Prof. Farmer will lecture on "Plants as Engineers." On January 24, Mr. C. W. Andrews will give an account of his work on "Christmas Island"; and on January 31, Prof. Frank Clowes will lecture on "Old Father Thames."

A NUMBER of forthcoming works on scientific subjects appear in the *Book Circular* (No. 69, Scientific Series), just issued by Messrs. Williams and Norgate. Among the volumes announced we notice the following:—The second volume of Dr. F. Dannemann's "Grundriss einer Geschichte der Naturwissenschaften," entitled "Geschichte der Naturwissenschaften aller Völker und Zeiten."—Prof. Ernest Haeckel's lecture to the Fourth International Zoological Congress at Cambridge will be issued, with notes and tables, under the title "Unsere gegenwärtige Kenntniss vom Ursprung des Menschen."—Another work by Prof. Haeckel, which is announced for publication in January, is "Kunstformen der Natur."—A work by Prof. O Bütschli, Professor of Zoology at Heidelberg, being a continuation of the same author's "Untersuchungen über microskopische Schäume," of which an English translation has been issued.—The second part of the second volume of Dr. Paul Knuth's "Handbuch der Blüten biologie," containing Lobeliaceæ to Coniferæ.—M. Riban, of the University of Paris, has prepared a "Traité d'analyse chimique quantitative par l'Electrolyse."—"La photographie animée," by E. Trutat, Director of the Natural History Museum of Toulouse.—A work by Prof. Lebon, of the Lycée Charlemagne, Paris, entitled "L'Histoire abrégée de l'Astronomie."—A volume by M. E. Bouty, Professeur de la Faculté des Sciences, on "Electricité à ondes Herziennes. Rayons X."

THE additions to the Zoological Society's Gardens during the past week include two Red-bellied Squirrels (*Sciurus variegatus*) from Trinidad, presented by Master Lawrence; a Palm Squirrel (*Sciurus palmarum*) from India, presented by Dr. G. Lindsay Johnson; a Pluto Monkey (*Cercopithecus leucampyx*, ♂) from Congoland, deposited; a Nutcracker (*Nucifraga caryocatactes*), a Common Sheldrake (*Tadorna cornuta*) European, purchased.

OUR ASTRONOMICAL COLUMN.

A TOTAL ECLIPSE OF THE MOON.—On Tuesday next (December 27) the moon will pass entirely into the shadow of the earth, and be totally eclipsed. The following are some of the particulars which may be useful to those who wish to observe this phenomenon, but fuller information, together with a list of stars to be occulted, will be found in the *Nautical Almanac* and the *Companion to the Observatory*.

	h.	m.	
First contact with the penumbra, Dec. 27,	8	26·5	G.M.T.
,, ,, shadow ...	9	39·4	
Beginning of total phase ...	10	49·0	
Middle of the eclipse	11	33·7	
End of total phase	12	18·4	
Last contact with the shadow ...	13	28·0	
,, ,, penumbra	14	40·9	

The moon meets the shadow at a point on her limb which is 112° from her north point towards the eastern side, and passes out at a point 95° towards the west.

The magnitude of the eclipse is represented as 1·383, the unit representing the case when conditions are such that the moon is only just able to be totally immersed for an instant.

COMET CHASE.—This comet, which is gradually brightening, is situated in the constellation of Leo Minor, and lies slightly to the north of the 6th magnitude star 50 in Leo Minor. The following is the ephemeris to the end of the present month.

1898.		R.A. (app.) h. m. s.		Decl. (app.) ° ′		Br.
Dec. 22	...	10 55 11	...	+26 59·8	...	1·39
24	...	56 44	...	27 19·0	...	,,
26	...	58 11	...	27 38·8	...	,,
28	...	10 59 31	...	27 59·0	...	,,
30	...	11 0 43	...	+28 19·7	...	1·39

COMETS *i* 1898 AND 1881 IV.—Writing in the *Astronomical Journal* (Nos. 448–450), Dr. Perrine, of the Lick Observatory, points out a distinct relationship between the comet *i* 1898 and 1881 IV. The similarity of the orbits is strikingly seen from the following comparison of the orbits:—

Comet.	ω ° ′	Ω ° ′	° ′	*q*
i 1898 ...	... 122 8 ...	97 17 ...	140 14 ...	0·6335
1881 IV....	... 123 22 ...	96 10 ...	140 19 ...	0·7564

Dr. Perrine states that although it is not possible for Brooks's comet to be a return of Schaeberle's, yet the resemblance is so close that a strong family connection is indicated. If we may be permitted to make a suggestion, might not there be two comets pursuing the same path? Just as comets are thinned out by their component parts lagging behind and following, so